



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,992	04/11/2001	Takanori Suzuki	107348-00097	8907

7590 05/23/2005

ARENT FOX KINTNER PLOTKIN & KAHN, PLLC  
Suite 600  
1050 Connecticut Avenue, N.W.,  
Washington, DC 20036-5339

EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
----------	--------------

1764

DATE MAILED: 05/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/829,992

Applicant(s)

SUZUKI ET AL.

Examiner

Jennifer A. Leung

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 9-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6 is/are rejected.
- 7) ☒ Claim(s) 4,5,7,8,15 and 16 is/are objected to.
- 8) ☒ Claim(s) 1-16 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment submitted on February 16, 2005 has been received and carefully considered. Claims 15 and 16 are newly added. Claims 9-14 are withdrawn from consideration. Claims 1-8, 15 and 16 are currently under prosecution.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockenfeller (US 5,441,716) in view of Kurooka et al. (JP 61-171998) and Asami et al. (US 4,393,924).

Regarding claim 1, Rockenfeller (FIG. 1, 2, 4; column 3, line 53 to column 5, line 29) discloses an apparatus comprising:  
a cylindrical hydrogen storage module (i.e., a reactor module) comprising:

a laminate including a plurality of adjacent hydrogen storage units (i.e., a plurality of reaction chambers, defined between adjacent plates **12, 14**) filled with hydrogen absorption materials (e.g., bivalent and monovalent adsorbents, or metal hydride adsorbent systems; column 18, lines 4-51), the laminate having a hydrogen absorption and desorption surface on at least a part of an outer peripheral surface of the laminate (i.e., located at gas permeable wall **16**);

at least one heating/cooling element (i.e., heat conductive fins or plates **12, 14**) positioned between adjacent ones of the hydrogen storage units; and

at least one main passage (i.e., heat transfer fluid conduits **10**) that passes through the laminate in a lamination direction of the hydrogen storage unit, wherein heating fluid and cooling fluid (i.e., a heat transfer fluid) pass through the at least one main passage **10**.

Although Rockenfeller does not illustrate an outer cylinder for containing the storage module, Rockenfeller further discloses that the storage module is to be contained in appropriate gas distribution means (i.e., "gas distribution components, i.e., tubes, reactor walls, channels, inlets, ports, vents etc., are preferably designed so that the mean mass diffusion path as defined above, in such a reactor is 15 mm or less," column 6, lines 45-51). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an outer cylinder to the apparatus of Rockenfeller, for containing the storage module and providing the appropriate gas distribution components. Additionally, the provision of an outer cylinder for containing a hydrogen storage module, according to the instantly claimed configuration, is well known in the art, as evidenced by Kurooka et al. In particular, Kurooka et al. (FIG. 1, Abstract) teaches an apparatus comprising an outer cylinder (i.e., pressure vessel **1**) and a cylindrical hydrogen storage module (i.e., as defined by metal hydride retainer **9**) positioned within the outer

Art Unit: 1764

cylinder 1, wherein the storage module 9 has an outer diameter smaller than an inner diameter of the outer cylinder (see FIG. 1), and wherein a hydrogen passage 7 is formed between an inner peripheral surface of the outer cylinder 1 and the storage module 9.

Rockenfeller is silent as to the heating/cooling elements (i.e., fins or plates 12,14) comprising subpassages that branch from the at least one main passage 10 in a direction perpendicular to the longitudinal axis and extending over within each of the heating/cooling elements. Asami et al. (FIG. 2a, 2b) teaches an apparatus comprising a laminate including a plurality of adjacent hydrogen storage units filled with hydrogen absorption materials (i.e., a regenerator chamber 104 packed with a hydrogen storing material, wherein the chamber may be provided at every second layer; column 3, lines 11-27); and at least one heating/cooling element (i.e., defined by metal plates 111 and fins 112) positioned between adjacent ones of the hydrogen storage units 104, wherein a plurality of subpassages (i.e., fluid pathways 102, 103, for a high temperature fluid or a lower temperature fluid) extend over within each of the heating/cooling elements. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide subpassages over within the heating/cooling elements in the apparatus of Rockenfeller, on the basis of suitability for the intended use thereof, because the subpassages or fluid pathways would make possible a wider range of heat application, by variably transmitting heat between a high temperature fluid or a low temperature fluid and the adjacent hydrogen storage material, as taught by Asami et al. (column 5, lines 6-41).

Regarding claim 2, as modified by Asami et al., above, the apparatus of Rockenfeller comprises a plurality of guide members (i.e., as defined by the corrugated fins 112; FIG. 2a, 2b; column 3, lines 18-33) that circulate the heating and cooling fluid through the subpassages.

Art Unit: 1764

3. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rockenfeller (US 5,441,716) in view of Kurooka et al. (JP 61-171998) and Asami et al. (US 4,393,924), as applied to claims 1 and 2 above, and further in view of Stetson et al. (US 6,099,811).

The collective teaching of Rockenfeller, Kurooka et al. and Asami et al. is silent as to each of the heating/cooling elements including a catalyst for facilitating a burning reaction of a heating fluid, such as a mixed gas of hydrogen and oxygen. Stetson et al. teaches an apparatus (FIG. 1) comprising a container 5 containing a hydrogen absorption material 40, wherein the material 40 comprises a "high-temperature" storage material, especially a magnesium-based alloy, characterized in that the storage material will have a 1-atmosphere equilibrium plateau pressure at temperatures at or above 100 °C (column 4, lines 28-43). The apparatus further comprises a heating element that utilizes a catalyst 34 (column 5, lines 32-40) for facilitating a burning reaction of hydrogen (supplied through inlet port 31) and oxygen (supplied through inlet port 37). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a catalyst for facilitating a burning reaction in the heating/cooling elements in the modified apparatus of Rockenfeller, on the basis of suitability for the intended use thereof (e.g., in cases wherein a "high temperature" hydrogen absorption material is selected), because the catalytic burning of hydrogen and oxygen would generate the high temperatures and heat of desorption optimally required of "high-temperature" hydrogen absorption materials, which temperature and heat often cannot be provided by most hydrogen-use applications, as taught by Stetson et al. (column 3, lines 40-59).

Art Unit: 1764

***Response to Arguments***

4. Applicant's arguments filed on February 16, 2005 with respect to the rejection of claim 1 under 35 U.S.C. 102(b) as being anticipated by Nakane et al. (US 4,270,360) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the newly applied prior art references, above.

***Allowable Subject Matter***


5. Claims 4, 5, 7, 8, 15 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

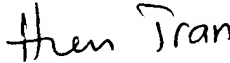
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung  
May 13, 2005 

  
**HIEN TRAN**  
**PRIMARY EXAMINER**